

Jet Grout in Five Minutes

Executive summary. Jet grout has been, and continues to be, a successful means of ground improvement. It can serve many purposes – two of the most common are structural support and groundwater control.

Definition of jet grout. Jet grout is a method of ground improvement wherein a drilling machine injects cement, water and air into the existing underground. What results is a homogenous mass soil-cement mixture. It is effective in mixable soils – for example, excellent in gravels but ineffective in rock mass.

Where would I use is in my project? It can serve a temporary need or a permanent need. Below is a test section (three overlapping jet grout columns)



Temporary

- Bottom “plug” for a cofferdam to **control groundwater** from entering the excavation from below.
- **Shaft construction** – secant and/or tangent walls which alone can serve as a shaft wall and/or with reinforcement in it (such as casing pipe, rebar, or dywidag).
- Vertical wall as a **closure** between two sheetpiles that couldn't be connected.
- Prevent soil and water from

entering a shaft laterally where **utilities penetrate** the sides of your shored excavation.

- Installation of a thick wall and thick bottom plug to serve, cross-sectionally, as the area in which the pipe is installed. This **bathtub effect** allows the contractor to dig in a homogenous mass of cemented soil (the walls and the invert of the trench are all “dried in” and you're digging in soil cement).
- **Tunnel heading** – serves as a “target” path for a tunneling machine to provide both stable and consistent soil to bore through.

Permanent

- **Foundation support** to a structure. See the QR code below for a pictorial example.
- **Load transfer** under a pipeline – pipe laid in weak soils can be supported by vertical jet grout columns which prevent vertical displacement of the pipe.
- **Cutoff wall** to prevent migration of underground fluids.

How is it installed? Keller does a great job here [QR] of showing, pictorially, how jet grout is installed. In simplest terms, here is how it is installed:



- Obtain a drilling machine with a hollow stem auger.
- Advance the drill to the desired elevation underground.
- Inject cement, water, and/or air through the rotating stem.
- Jet the grout (cement, water, and/or air) into the soil by starting at the deepest elevation and then pulling up the drill stem at discrete increments.

The result is a column of jet grouted soil.

My story. I've been on projects for the past twenty (20) years which have used jet grout in the manners described above. To the left here is a trench with a jet grout bottom plug resisting about 20' of head outside the sheetpile trench – look at the pipe subgrade, dry!



I've seen it be very effective, and I've seen it misapplied in a massive rock strata. It takes a plant to feed it (pumps, equipment, cement silos, et cetera), so it's definitely a specialty operation, and one that takes a significant footprint near the installation location. It's also messy. But overall, I'm a supporter!

Work Safe!